[*J. Soc. Powder Technol., Japan*, **38**, 160-168 (2001)] [Lab. of Pharm. Engineering]

Development of Agglomerated Crystals of Ascorbic Acid for Direct Tableting by Spherical Crystallization Technique and Evaluation of Their Compactibilities.

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Spherically agglomerated crystals of ascorbic acid for direct tableting were successfully prepared by the spherical crystallization technique. The micromeritic and compaction properties of the original ascorbic acid crystals were dramatically improved. The dominating mechanisms of improved compaction properties of the spherically agglomerated crystals depended on their fragmentation and plastic deformation during compaction. This mechanism was supported by higher stress relaxation and less elastic recovery of the compact of agglomerated crystals in comparison with the original crystals. The spherically agglomerated crystals were tableted directly without capping using a single punch machine under dynamic compaction, although the tensile strength of tablet with the spherically agglomerated crystals decreased with increasing compression speed.

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Mucoadhesive nanoparticulate systems for peptide drug delivery.

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This chapter describes the preparation of and methods for evaluating mucoadhesive nanoparticulate systems, including liposomes and polymeric nanoparticles. Mucoadhesive ability is conferred on the particulate systems by coating their surface with mucoadhesive polymers such as chitosan and Carbopol. The feasibility of this surface modification was confirmed by measuring the zeta potential. Several methods of evaluating the mucoadhesive properties of particulate systems have been reported in the literature. We have also developed some novel evaluation procedures including a particle counting method using a Coulter counter for polymer-coated liposomes. The mucoadhesive properties of the polymer-coated liposomes and polymeric nanoparticles were confirmed by means of these mucoadhesion tests. In applying these mucoadhesive nanoparticles to the oral and pulmonary administration of peptide drugs, more effective and prolonged action was observed in comparison with non-coated systems, thereby confirming the usefulness of mucoadhesive nanoparticulate systems for the delivery of peptide drugs.

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Biodegradable Nanoparticles for Targeted Drug Delivery in Treatment of Inflammatory Bowel Disease.

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The use of nanoparticles for targeted oral drug delivery to the inflamed gut tissue in inflammatory bowel disease was examined. An experimental colitis was induced by trinitrobenzenesulfonic acid to male Wistar rats. Rolipram, an anti-inflammatory model drug, was incorporated within poly (lactic-co-glycolic acid) nanoparticles, which were administered once a day orally for five consecutive days. All nanoparticle formulations proved to be as efficient as the drug in solution in mitigating the experimental colitis. The clinical activity score and myeloperoxidase activity decreased significantly after the oral administration of rolipram nanoparticles or solution. The rolipram solution group had a high adverse effect index, whereas the rolipram nanoparticle groups proved their potential to retain the drug from systemic absorption as evidenced by a significantly reduced index. The nanoparticle deposition in the inflamed tissue should be given particular consideration in the design of new carrier systems for the treatment of inflammatory bowel disease.

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Design of rolipram-loaded nanoparticles: comparison of two preparation methods.

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The aim of the present work was to investigate the preparation of nanoparticles as a potential drug carrier and targeting system for the treatment of inflammatory bowel disease. Rolipram was chosen as the model drug to be incorporated within nanoparticles. Pressure homogenization-emulsification (PHE) with a microfluidizer or a modified spontaneous emulsification solvent diffusion method (SESD) were used to prepare nanoparticles. The rolipram encapsulation efficiency was high (>85%) with the PHE method in all cases, whereas with the SESD method encapsulation efficiencies were lower (<40%) when lower surfactant concentrations and reduced volume of aqueous phase were used. Release profiles were characterized by a substantial initial burst release with the PHE method (25-35%) as well as with the SESD method (70-90%). A more controlled release was obtained after 2 days of dissolution with the PHE method (70-90%), no further significant drug release was observed with the SESD method.